CLAIMS

What is claimed is:

1. A micro-electro-mechanical system (MEMS) switch comprising:

an actuating portion attached with a substrate;

an actuating portion contact disposed on the actuating portion, the actuating portion contact being located between the actuating portion and the substrate; and

a substrate contact on top of the substrate, the substrate contact including a metal platform portion extending a height therefrom toward the actuating portion contact, wherein the actuating portion contact and the substrate contact are aligned to contact when the actuating portion is moved from a first position to a second position,

wherein an area of the metal platform portion is independently selectable of an area of the actuating portion contact.

2. A switch of claim 1, wherein the metal platform portion is comprised of at least one metal selected from a group consisting of: gold, platinum, silver, copper, aluminum, and molybdenum.

3. A switch of claim 2, wherein the substrate is comprised of at least one material selected from a group consisting of: gallium arsenide, indium phosphide, high resistivity silicon, glass, ceramic, and silicon germanium.

4. A switch of claim 3, wherein the actuating portion is a cantilever structure, the cantilever structure having a first region and a second region, the first region of the cantilever structure being attached with the substrate.

5. A switch of claim 4, further comprising a first RF transmission line and a second RF transmission line formed on the substrate, wherein the actuating portion contact is formed as a contact transmission line having a first contact region and a second contact

region, with the first contact region aligned with the at least a portion of the first RF transmission line, and the second contact region aligned with at least a portion of the second RF transmission line, whereby when the cantilever is moved from the first position to the second position, the contact transmission line forms an electrical path between the first and second RF transmission lines.

6. A switch of claim 5 further comprising:

a substrate bias electrode disposed on the substrate; and

a cantilever bias electrode included with the cantilever, the substrate bias electrode and the cantilever bias electrode forming a bias electrode pair such that the bias electrode pair may be actuated to urge the cantilever bias electrode toward substrate bias electrode moving the cantilever structure from the first position to the second position.

7. A switch of claim 4 further comprising a first RF transmission line and a second RF transmission line formed on the substrate, wherein the actuating portion contact is formed as a contact transmission line having a first contact region and a second contact region, with the first contact region attached with at least a portion of the first RF transmission line, and the second contact region aligned with at least a portion of the second RF transmission line, whereby when the cantilever is moved from the first position to the second position, the contact transmission line forms an electrical path between the first and second RF transmission lines.

8. A switch of claim 4, wherein the cantilever structure has into two sections a DC cantilever section and a RF cantilever section, the DC cantilever section being attached with the substrate at a first portion and the RF cantilever section being attached with the substrate at a first portion, the switch further comprising:

a first RF transmission line disposed on the substrate, the first RF transmission line including the substrate contact; and

a second RF transmission line, the second RF transmission line being included with the RF cantilever section, the second RF transmission line including the actuating portion contact,

whereby when the cantilever is moved from the first position to the second position the actuating portion contact contacts the substrate contact creating an electrical path between the first and second RF transmission lines.

9. A switch of claim 8 further comprising:

a substrate bias electrode disposed on the substrate; and

a DC cantilever bias electrode included with the DC cantilever section, the substrate bias electrode and the DC cantilever bias electrode forming a bias electrode pair such that the bias electrode pair may be actuated to urge the DC cantilever bias electrode toward the substrate bias electrode moving the cantilever structure from the first position to the second position.

10. A switch of claim 4, wherein the second region of the cantilever structure is attached with the substrate.

11. A switch of claim 10 further comprising:

a first RF transmission line included with the cantilever structure, wherein the first RF transmission line includes the actuating portion contact;

a second RF transmission line disposed on the substrate, the second RF transmission line including the substrate contact, whereby when the cantilever is moved from the first position to the second position the actuating portion contact contacts the substrate contact.

12. A switch of claim 11 further comprising:

a substrate bias electrode disposed on the substrate; and

a cantilever bias electrode included with the cantilever structure, the substrate bias electrode and the cantilever bias electrode forming a bias electrode pair such that the bias electrode pair may be actuated to urge the cantilever bias electrode toward the substrate bias electrode moving the cantilever structure from the first position to the second position.

13. A switch of claim 1, wherein the substrate is comprised of at least one material selected from a group consisting of: gallium arsenide, indium phosphide, high resistivity silicon, glass, ceramic, and silicon germanium.

14. A switch of claim 1, wherein the actuating portion is a cantilever structure, the cantilever structure having a first region and a second region, the first region of the cantilever structure being attached with the substrate.

15. A switch of claim 1further comprising:

a substrate bias electrode disposed on the substrate; and

an actuator bias electrode included with the actuating portion, the substrate bias electrode and the actuator bias electrode forming a bias electrode pair such that the bias electrode pair may be actuated to urge the actuator bias electrode toward substrate bias electrode moving the actuating portion from the first position to the second position.

16. A micro-electro-mechanical system (MEMS) switch comprising:

a means for supporting;

a movable portion having a first part and a second part, one part of the movable portion fixed with the means for supporting,

a first means for conducting energy located on the movable portion between the movable portion and the means for supporting; and

a second means for conducting energy located on the means for supporting, wherein the second means for conducting includes a metal platform portion extending a height therefrom in a direction toward the movable portion, wherein the first means for conducting and the metal platform portion are aligned to contact when the movable portion is moved from a first position to a second position,

wherein a top area of the metal platform portion is independently selectable from a top area of the first means for conducting.

17. A switch of claim 16, wherein the metal platform portion is comprised of at least one metal selected from a group consisting of: gold, platinum, silver, copper, aluminum, and molybdenum.

18. A switch of claim 17, wherein the means for supporting is comprised of at least one material selected from a group consisting of: gallium arsenide, indium phosphide, high resistivity silicon, glass, ceramic, and silicon germanium.

19. A switch of claim 18, wherein the movable portion is a cantilever structure, the cantilever structure having a first region and a second region, the first region of the cantilever structure being attached with the means for supporting.

20. A switch of claim 19 further comprising:

a first means for RF transmission and a second means for RF transmission formed on the means for supporting, wherein first means for conducting is formed as third means for RF transmission having a first means for contact and a second means for contact, with the first means for contact aligned with the at least a portion of the first means for RF transmission, and the second means for contact aligned with at least a portion of the second means for RF transmission, whereby when the movable portion is moved form the

first position to the second position, the third means for RF transmission forms an electrical path between the first and second means for RF transmission.

21. A switch of claim 20 further comprising:

a first means for moving the movable portion; and

a second means for moving the movable portion, the first means for moving being attached with the means for supporting and the second means for moving being integrated with the movable portion, such that the first and second means for moving may be actuated to urge the first means for moving toward the second means for moving resulting in moving the movable portion from the first position to the second position.

22. A switch of claim 19 further comprising a first means for RF transmission and a second means for RF transmission formed on the means for supporting, wherein first means for conducting is formed as third means for RF transmission having a first means for contact and a second means for contact, with the first means for contact attached with at least a portion of the first means for RF transmission, and the second means for contact aligned with at least a portion of the second means for RF transmission, whereby when the movable portion is moved form the first position to the second position, the third means for RF transmission forms an electrical path between the first and second means for RF transmission.

23. A switch of claim 19, wherein the cantilever structure is divided into two sections a DC cantilever section and a RF cantilever section, the DC cantilever section having a first portion and a second portion, the RF cantilever section having a first portion and a second portion, the first portion of the DC cantilever section being attached with the means for supporting and the first portion of the RF cantilever structure being attached with the means for supporting, the switch further comprising:

a first means for RF transmission disposed on the means for supporting, the first means for transmission including the second means for conducting; and

a second means for RF transmission, the second means for RF transmission being included with the RF cantilever structure,

whereby when the cantilever is moved form the first position to the second position the first means for conducting contacts the second means for conducting creating an electrical path between the first and second means for RF transmission.

24. A switch of claim 23 further comprising: a means for moving the cantilever structure from a first position to a second position.

25. A switch of claim 19, wherein the second region of the cantilever structure is attached with the means for supporting.

26. A switch of claim 25 further comprising:

a first means for RF transmission included with the cantilever structure, wherein the first means for RF transmission includes the first means for conducting;

a second means for RF transmission disposed on the means for supporting, wherein the second means for RF transmission includes the second means for conducting, whereby when the cantilever structure is moved from the first position to the second position the first means for conducting contacts the second means for conducting.

27. A switch of claim 26 further comprising: a means for moving the cantilever structure from the first position to the second position.

28. A switch of claim 27, wherein the means for supporting is comprised of at least one material from a group consisting of: gallium arsenide, indium phosphide, high resistivity silicon, glass, ceramic, and silicon germanium.

29. A switch of claim 16, wherein the movable portion is a cantilever structure, the cantilever structure having a first region and a second region, the first region of the cantilever structure being attached with the means for supporting.

30. A switch of claim 29 further comprising: a means for moving the movable portion from the first position to the second position.

31. A process for manufacturing a micro-electro-mechanical switch, said process comprising the acts of:

forming a base contact electrode having a metal platform portion on a substrate, wherein the metal platform portion protrudes from the substrate;

connecting a movable actuator to said substrate at a first end and extending a second end of said movable actuator above the metal platform portion; and

including an actuator contact with the movable actuator above the metal platform portion, wherein a top area of the metal platform portion is independently selectable from a top area of the actuator contact and wherein the metal platform electrode and the actuator contact are aligned to contact when the movable actuator is moved from a first position to a second position.

32. A process of claim 31, wherein the act of forming a contact electrode having a metal platform portion is performed by acts selected from a group of acts consisting of:

Group 1: depositing a first metal layer on the substrate where the first metal layer forms the contact electrode and the metal platform portion, and depositing a sacrificial layer over at least a portion of the first metal layer; and

Group 2: depositing a first metal layer on the substrate, where the first metal layer forms the contact electrode and depositing a second metal layer on the first metal layer, where the second metal layer forms the metal platform portion, and depositing a sacrificial layer over at least a portion of the first and second metal layers.

33. A process of claim 32, wherein the sacrificial layer is a non-metal layer.

34. A process of claim 33, wherein the wherein the metal platform portion is comprised of at least one metal selected from a group consisting of: gold, platinum, silver, copper, aluminum, and molybdenum.

35. A process of claim 34, wherein the substrate is comprised of at least one material selected from a group consisting of: gallium arsenide, indium phosphide, high resistivity silicon, glass, ceramic, and silicon germanium.

36. A process of claim 31, wherein the wherein the metal platform is comprised of at least one metal selected from a group consisting of: gold, platinum, silver, copper, aluminum, and molybdenum.

37. A MEMS switch produced by the process of claim 31.